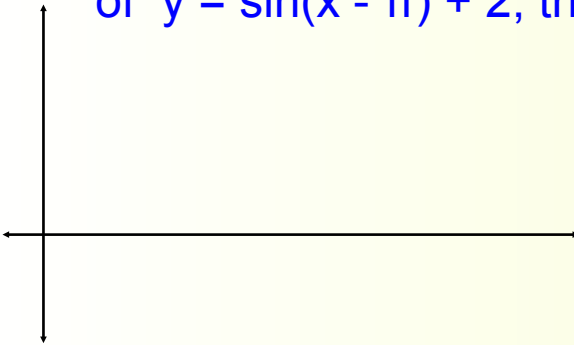


Alg. 2 Warm Up # 9-5

parent:

1. Describe the transformations of the graph of $y = \sin(x - \pi) + 2$, then sketch



2. Draw the angle in standard position and state the reference angle.

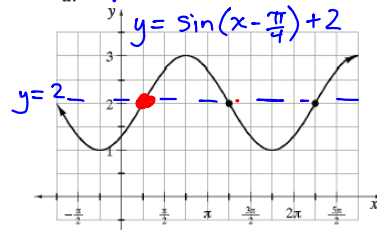
- a) 285° b) 5.2 radians c) - 3.3 rad.

HW Questions:

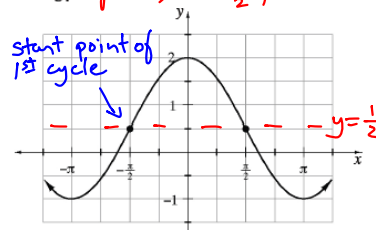
Preview

7-129. Find an equation for each graph below.

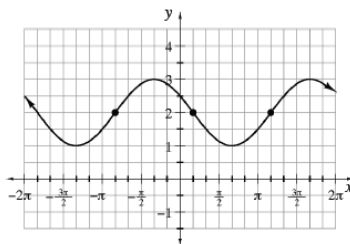
- a. up 2, right $\frac{\pi}{4}$, $a=1$



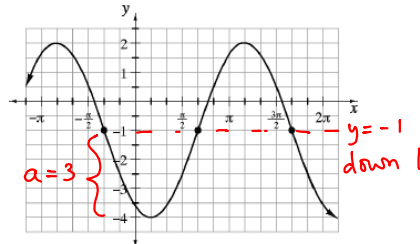
- b. up $\frac{1}{2}$, left $\frac{\pi}{2}$, $a = \frac{3}{2}$



c.



- d. reflection in x-axis



$\frac{\pi}{2} \cdot \frac{1}{3} = \frac{\pi}{6}$ units between each mark.
Left $\frac{2\pi}{6}$ or $\frac{\pi}{3}$

7-130. Claudia graphed $y = \cos \theta$ and $y = \cos(\theta + 360^\circ)$ on the same set of axes. She did not see any difference in their graphs at all. Why not?

- 7-131. This problem is a checkpoint for completing the square to find the vertex of a parabola. It will be referred to as Checkpoint 7B.



Complete the square to change the equation $y = 2x^2 - 4x + 5$ into graphing form. Identify the vertex of the parabola and sketch the graph.

y-int: $y + 2 = \log_3(0 - 1)$
 There is no power for the base 3 that will give you -1, so no y-int.

- 7-132. Find the x- and y-intercepts of the graphs of each of the following equations.

a. $y = 2x^3 - 10x^2 - x$

b. $y + 2 = \log_3(x - 1)$
 x-int: $0 + 2 = \log_3(x - 1)$
 now change to exponent form

- 7-133. The average cost of movie tickets is \$9.50. If the cost is increasing 4% per year, in how many years will the cost double?

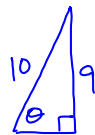
- 7-134. Change each equation to graphing form. For each equation, find the domain and range and determine if it is a function.

a. $y = -2x^2 - x + 13$

b. $y = -3x^2 - 6x + 12$

$y = -2\left(x^2 + \frac{1}{2}x + \frac{1}{16}\right) + 13 + \frac{1}{8}$ $y = -3(x^2 + 2x + 1) + 12 + 3$
 $y = -3(x + 1)^2 + 15$

- 7-135. Too Tall Thomas has put Rodney's book bag on the snack-shack roof. Rodney goes to borrow a ladder from the school custodian. The tallest ladder available is 10 feet long and the roof is 9 feet from the ground. Rodney places the ladder's tip at the edge of the roof. The ladder is unsafe if the angle it makes with the ground is more than 60° . Is this a safe situation? Justify your conclusion.



$\theta = \sin^{-1}\left(\frac{9}{10}\right)$

$\frac{8}{8} \cdot \frac{13}{1} + \frac{1}{8}$

$y = -2\left(x + \frac{1}{4}\right)^2 + \frac{105}{8}$

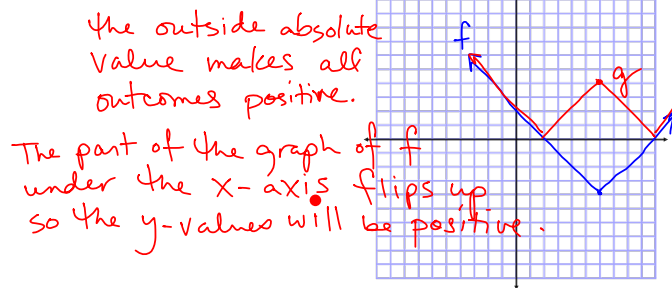
Dom: \mathbb{R}
 Range: $y \leq \frac{105}{8}$ $\left(-\frac{1}{4}, \frac{105}{8}\right)$

7-136. Deniz's computer is infected with a virus that will erase information from her hard drive. It will erase information quickly at first, but as time goes on, the rate at which information is erased will decrease. In t minutes after the virus starts erasing information, $5,000,000(\frac{1}{2})^t$ bytes of information remain on the hard drive.

- Before the virus starts erasing, how many bytes of information are on Deniz's hard drive?
- After how many minutes will there be 1000 bytes of information left on the drive?
- When will the hard drive be completely erased?

7-137. Graph $f(x) = |x - 6| - 4$.

- Explain how you can graph this without making an $x \rightarrow y$ table, but using parent graphs.
- Graph $g(x) = ||x - 6| - 4|$. Explain how you can graph $g(x)$ without making an $x \rightarrow y$ table by using your earlier graph.



Yesterday's CP's:

7-127. Now that you have seen that it is possible to have a sine graph with a cycle length other than 2π , work with your team to make conjectures about how you could change your general equation to allow for this new transformation.

- In the general equation $y = a \sin(x - h) + k$, the quantities a , h , and k are called **parameters**. Where could a new parameter fit into the equation?
- Use your graphing calculator to test the result of putting this new parameter into your general equation. Once you have found the place for the new parameter, investigate how it works. What happens when it gets larger? What happens when it gets smaller?
- Write a general equation for a sine function that includes the new parameter you discovered.



vertical stretch or compression $h \rightarrow$ horizontal translation

$a =$ amplitude \rightarrow

distance from midline to max or min

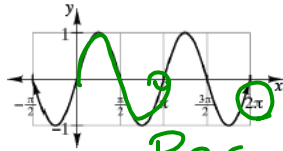
$y = a \sin(b(x - h)) + k$ \leftarrow vertical translation

$\sin(2x - 6)$

$2(x - 3)$

7-128. Another word for cycle length is **period**. Which of the following have a period of 2π ? Which do not? How can you tell? If the period is not 2π , what is it?

a.



Per = π

c. $y = \sin \theta$

Per = 2π

b. A pendulum takes 3 seconds to complete one cycle.

Per = 3 sec.

d. A radar line takes 1 second to travel through 1 radian.

Per = 2π

Week 9 Classwork

Warm Up

CP's 7 - # 113, 115 → white WS

Salmon WS Sine graphs

CP's 7 - # 126 ---> 128

CP's: 7- #139 ---> 142, skip 140

p. 354

7-139. Make sure your graphing calculator is in radian mode.



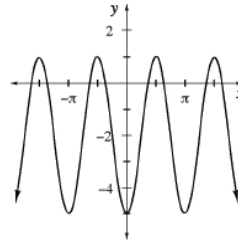
- a. Set the domain and range of the viewing window so that you would see just one complete cycle of $y = \sin x$. What is the domain for one cycle? What is the range?
- b. Graph $y = \sin x$, $y = \sin(0.5x)$, $y = \sin(2x)$, $y = \sin(3x)$, and $y = \sin(5x)$. Make a sketch and answer the following questions for each equation.
 - i. How many cycles of each graph appear on the screen?
 - ii. The **midline** is the horizontal axis that goes through the center of the graph. What is the equation for the midline of these graphs?
 - iii. What is the **amplitude** (height above the midline) of each graph?
 - iv. What is the period (cycle length) of each graph? Per = $\frac{2\pi}{b}$
b = # of cycles in 2π
 - v. Is each equation a function?
- c. Make a conjecture about the graph of $y = \sin(bx)$ with respect to each of the questions (i) through (v) above. If you cannot make a conjecture yet, try more examples.
- d. Create at least three of your own examples to check your conjectures. Be sure to include sketches of your graphs.
- e. What is the relationship between the period of a sine graph and the value of b in its equation?

7-141. *Without* using a graphing calculator, describe each of the following functions by stating the amplitude, period, horizontal shift, and midline (vertical shift). Using this information, sketch the graph of each function. *After* you have completed each graph, check your sketch with a graphing calculator and correct and explain any errors.



- | | |
|-------------------------------------|--|
| a. $y = \sin 2(x - \frac{\pi}{6})$ | b. $y = 3 + \sin(\frac{1}{3}x)$ |
| c. $y = 3\sin(4x)$ | d. $y = \sin \frac{1}{2}(x + 1)$ |
| e. $y = -\sin 3(x - \frac{\pi}{3})$ | f. $y = -1 + \sin(2x - \frac{\pi}{2})$ |

- 7-142. Farah and Thu were working on writing the equation of a sine function for the graph at right. They figured out that the amplitude is 3, the horizontal shift is $\frac{\pi}{4}$ and the midline is $y = -2$. They can see that the period is π , but they disagree on the equation. Farah has written $f(x) = 3 \sin 2(x - \frac{\pi}{4}) - 2$ and Thu has written $f(x) = 3 \sin(2x - \frac{\pi}{4}) - 2$.



- Whose equation is correct? How can you be sure?
- Graph the incorrect equation and explain how it is different from the original graph.

HW: 7-

#144 ---> 151